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ENVIRONMENTAL ASSESSMENT

PROPOSED OUTER CONTINENTAL SHELF OIL AND GAS LEASE SALE FOR EEL RIVER BASIN

Prepared by

Bureau of Land Management
Department of the Interior

APRIL 1981

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UNITED STATES
DEPARTMENT OF THE INTERIOR

Bureau of Land Management

Environmental Assessment Regarding Proposed Outer Continental Shelf Oil and Gas Lease Sale in the Eel River Basin

The Bureau of Land Management, pursuant to 40 CFR Part 1501.3, has prepared an Environmental Assessment which evaluates the potential impacts of oil and gas leasing, exploration, and development on 30 tracts on the Outer Continental Shelf in the Eel River Basin, offshore Humboldt County, California. These 30 tracts are included in the proposal known as Proposed OCS Oil and Gas Lease Sale No. 53. The Draft and Final Environmental Impact Statements for proposed OCS Sale No. 53 analyzed the potential impacts of the leasing, exploration, and development of gas resources in the Eel River Basin. However, the analysis in the Environmental Impact Statement assumed there were no economically recoverable oil resources in these tracts. In August 1980, the U.S. Geological Survey revised the resource estimates for proposed OCS Sale No. 53, indicating that economically recoverable oil resources are likely to exist in the Eel River tracts. The Secretarial Issue Document prepared for the decision on the proposed sale re-evaluated the impacts in the Eel River Basin based on the assumption that both oil and gas may be found in the Eel River tracts.

The Environmental Assessment prepared for the Eel River Basin includes information found in both the Final Environmental Impact Statement and the Secretarial Issue Document and considers the potential impacts which may result from the development of both oil and gas in the basin. It has been determined that there would be no significant environmental impacts from leasing, exploration, and development in the Eel River Basin in addition to those which have been analyzed in the Sale No. 53 Environmental Impact Statement and and this Environmental Assessment for the Eel River Basin.

The Environmental Assessment is being made available to the public for review and comment. Copies may be obtained by contacting the Manager, Pacific OCS Office, Bureau of Land Management, 1340 W. 6th Street, Los Angeles, California 90017, or the Office of Public Affairs, Bureau of Land Management (130), Washington, D.C. 20240. Comments should be addressed to Director (542), Bureau of Land Management, Washington, D.C. 20240, and should be submitted on or before 30 days from the date of publication of this notice.

Arnold E. Petty
Director, Bureau of Land Management
ACTING

APR 24 1981

I. Description of the Proposed Action

A. Background Data

Under the Outer Continental Shelf (OCS) Lands Act of August 7, 1953, (43 U.S.C. 1331-1343), as amended (92 Stat. 629), and the regulations issued thereunder (43 CFR 3300), the Department of the Interior is responsible for administering the mineral development of the Outer Continental Shelf. In the case of oil and gas development, the process involves several steps. These are as follows: 1) OCS Planning Schedule; request for Resource Reports; 3) Call for Nominations and Comments; 4) Tentative Tract Selection; 5) Scoping Meetings; 7) Endangered Species Consultation; 8) Final Environmental Statement and Secretarial Issue Document; 9) Coordination with State(s); 10) Notice of Sale; 11) Sale; 12) Activity after a Sale; 13) Environmental monitoring.

The Call for Nominations (Step 3) was issued on November 29, 1977 for areas off the central and northern California coast. On October 10, 1978, the Department of Interior announced selection of 243 tracts comprising 532,588 hectares for intensive environmental study for proposed OCS Sale No. 53. The subsequent steps outlined in paragraph 1 above have been followed, through point number 9. These are detailed in the Final Environmental Impact Statement (FEIS) for Proposed OCS Sale No. 53 (Department of the Interior (DOI), 1980). However, subsequent to the issuance of the FEIS the U.S. Geological Survey (USGS) revised its estimate of resources in the northernmost basin, Eel River. Initially, gas, but no oil, was estimated to be present and the analysis was made accordingly. This Environmental Assessment has been performed to analyze the potential impacts to the Eel River Basin area based upon present estimates that both oil and gas are present.

B. Description of the Proposal

This proposed federal action which is the subject of this environmental assessment is a 1981 sale of oil and gas leases on the Outer Continental Shelf (OCS) offshore Humboldt County in northern California. Administrative events leading up to the proposal are discussed on pages 1-3 through 1-8 of the Final Environmental Impact Statement for OCS Sale No. 53. The proposed Sale area includes 30 tracts with a total area of about 66,301 hectares (163,763 acres). The tracts range seaward from 3 miles to as far as 25 miles, and lie in water depths ranging from 28 to 660 meters. Currently, there are no federal or state oil and gas leases in the area. See Figure I-1.

The U.S. Geological Survey (USGS), Conservation Division, Los Angeles, California, estimated the undiscovered economically recoverable oil and gas resources within the proposed sale tracts (see Table I-1). The conditional estimates assume that the area does have hydrocarbon resources present. The risked estimates incorporate the likelihood of not discovering oil and gas.

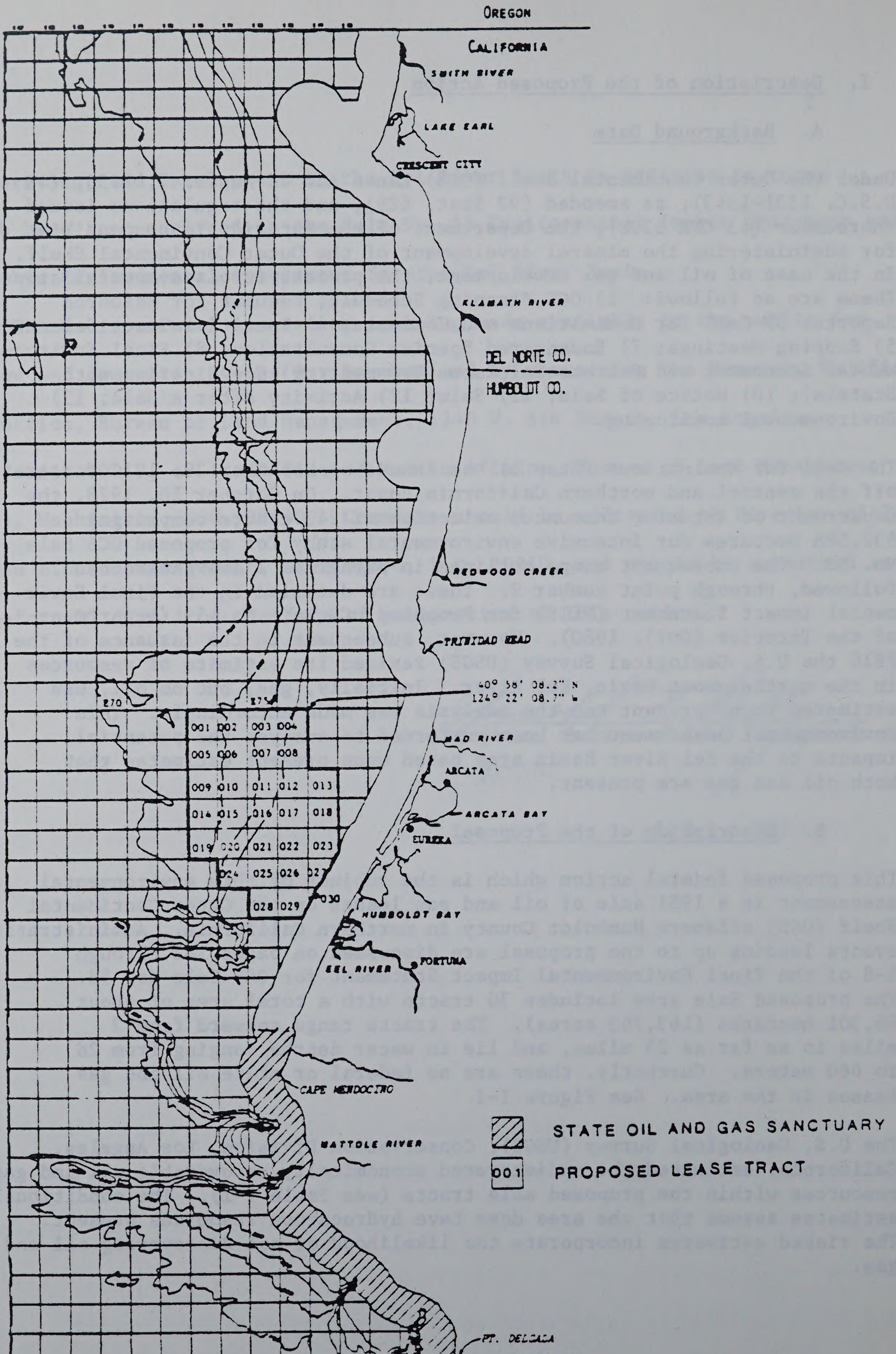

Figure I-1 Area proposed for oil and gas leasing and analyzed under Environmental Assessment.

TABLE I-1

ESTIMATES OF OIL AND GAS RESOURCES

	OIL (millions of barrels)	GAS (billion cubic feet)
Conditional mean	111	315
Risked mean	42	120

These resource estimates form the basis for estimating potential environmental losses and multiple-use conflicts if the area were leased and subsequently developed.

Production of oil and gas from the proposed sale area is estimated to begin in 1986 and continue until 2005 with the maximum daily production occurring in 1990. All oil production resulting from this proposal is assumed to back out an equal amount of either foreign or Alaskan imports to California. The transportation scenario assumes that gas would be transported from offshore gathering lines to shore, continuing onshore for approximately 5 miles and then connecting to an existing gas line. Oil is assumed to be transported by tankers to refineries in the San Francisco Bay area. The following table (I-2) shows the level and approximate timing of development expected in the proposed Sale area.

TABLE I-2

EEL RIVER BASIN PROPOSED SALE AREA
DEVELOPMENT TIMETABLE

	Exploratory Wells	Delineation Wells[a]	Development Wells	Platform	Subsea[b]
1981	2				
1982	3				
1983	2	2			
1984	2	4			
1985	1	4			
1986					
1987			58	1	
1988			29	2	
1989			38	0	1
1990			40	1	1
Total:	10	10	165	4	2

---

[a] These are sometimes also termed exploratory wells.

[b] Subsea or floating production system.

Based on resource estimates and the development timetable, additional information was generated for use in impact assessment (see Table I-3). There would be a statistically expected 0.24 oil spills of 1,000 barrels or greater over the life of the project. No petroleum refineries are expected to be constructed in California as a result of this proposal. An additional 13 miles of offshore pipeline and 5 miles of onshore pipeline could be layed. A temporary fifteen acre support base may be sited in area between the Eel and Mad Rivers. A permanent onshore operations facility may be built, by about 1985, near Humboldt Harbor. The scenario is for use in estimating impacts; actual development will be subject to applicable Federal, state, and local regulations, land use plans, policies, or controls.

TABLE I-3

DEVELOPMENTAL ASSUMPTIONS OVER PROJECT LIFE
(Most Probable Resources)

Pipeline Offshore[a] (Miles)	Pipeline Onshore (Miles)	Sediment[b] (Cu.Yds.)	Cuttings (000 Bbls.)	Drilling Mud (000 Bbls.)	Formation Water (Mil Bbl)	Sewage (Gal/Day)
13	5	49,900	235.1	100.6	19.8	4,000-8,000

[a] Includes offshore delivery and gathering lines.
[b] Amount of sediment disturbed with pipeline burial.

C. Alternatives

There are five major alternatives to Alternative 1, the Proposed Action. Each will be summarized below. An in depth discussion of how each of these alternatives could alter the potential impacts is given in the FEIS for Sale No. 53.

Alternative 2 - Modify the Sale by Deleting Part of the Eel River Basin to Enhance Protection of Commercial Fisheries

This alternative would eliminate tracts 1, 5, 9, 14 and 19 which overlap the Dover sole (*Microstomus pacificus*) spawning grounds and tracts 2, 3, 6, 7, 10, 11, 15, 16, 20 and 24 which overlap the Petrale sole (*Eopsetta jordani*) spawning grounds. These two groups of tracts comprise 52 percent, by area, of the Eel River Basin tracts.

The Eel River Basin is one of the world's most productive fishing grounds. In 1975, the most recent year for which there is comprehensive data, 3,900,000 pounds of flatfish worth $586,000 were caught in this basin. This represents over 10 percent of all flatfish caught in California. As noted above, Petrale and Dover sole both have important spawning grounds in this basin. Discharge of drilling muds and cuttings could deleteriously affect the spawning grounds, spawning behavior, and the survival of eggs, larvae, and juveniles. Manmade structures could cause physical disruption of the spawning grounds. Disruption of these spawning areas probably would seriously impact the populations and their fisheries. This alternative would eliminate impacts from drilling muds, drill cuttings and manmade structures by eliminating tracts that overlap these spawning areas. Similar spawning areas are not known to occur in any of the other proposed OCS lease Sale #53 tracts.

Adoption of this alternative could also reduce impacts from the proposed Sale to air quality, harbor seals, birds, terrestrial plants and animals, the endangered gray whale, other biological communities, other commercial and sport fisheries, the population, employment, the economy, a proposed traffic lane, cultural resources and geohazards.

Alternative 3 - Modify the Sale by Deleting Tracts to Enhance Protection of Sensitive Biological Areas

This alternative lists possible deletion options not already listed under the commercial fishing alternative. Tracts 3, 4, 7, 8, 11 and 12 are located over an area of extensive hard rock outcops and reefs. These provide extremely important habitat to a diverse range of benthic organisms, including many species of fish. Deleting these tracts would eliminate potentially deleterious impacts from drilling muds, cuttings, sewage discharge, platform and equipment placement.

Alternative 4 - Modify the Sale by Deleting Part of the Eel River Basin for Reasons of Geologic Hazards

This alternative deletes lease tracts selected by the United States Geological Survey for stipulation due to the presence of geologic hazards and/or constraints. Deletion recommendations by the State of California were also considered in developing this alternative, though some modification of the State's recommendations has occurred in light of new data acquisition.

The removal of these tracts represents a substantial decrease in the amount of acreage available for leasing (see Figure II-1).

The proposed alternative would reduce the possibility of geologic phenomena impacting OCS exploration or development activities by deleting tracts which are characterized by mass movement.

The deletion of those lease tracts identified within this alternative would reduce the possibility of an oil spill generated by pipeline rupture, platform collapse or well disruption as well as reduce the potential for loss of life and/or equipment due to fault motion, seismic ground shaking, or seafloor instability associated with the geologic features identified above.

Alternative 5 - No Sale

Not holding the Sale would result in foregoing those environmental impacts noted under Alternative 1. It would also mean foregoing oil and gas resources resulting from the Sale, with concommitant implications for increased oil imports and lessened security relative to energy supply sources. This alternative would be at variance with current national policy encouraging increased domestic production of oil and gas.

Alternative 6 - Delay the Sale

A delay would hold up production activities. The period of delay would be the determining factor as to the extent of impacts. Delay would likely increase crude oil imports. It could also allow additional time for: 1) environmental studies, 2) possible technological improvements in OCS operations to increase resource recovery, and 3) an extension of lead time for local governmental bodies to plan for onshore impacts.

D. Mitigating or Enhancing Measures

To mitigate known impacts that have become apparent during environmental analysis, stipulations that have been developed during previous OCS sales are recommended so that those potential impacts can be reduced or eliminated. The following stipulations are planned:

*Biological Stipulation
*Cultural Resource Stipulation
*Geological Stipulations
*Military Stipulation No. 1
*Military Stipulation No. 2
*Transportation of Hydrocarbon Products
*Wells and Pipelines
*Shallow Gas &a/

The FEIS for Sale No. 53 (DOI, 1980) should be consulted for a complete description of these stipulations.

Other mitigating actions considered in the analysis of this proposed action are completely discussed in the FEIS for Sale No. 53. They are:

*Contingency Plans
*Oil Spill Fund
*Fishermen's Contingency Fund
*Oil Spill Prevention and Mitigation
*Oil Spill Modeling
*Prevention of Groundwater Contamination
*Exploration and Development Plans
*Structural Verification Program
*Notices to Lessees and Operations
*Aircraft Overflight Restrictions

& a/ The Shallow Gas stipulations was described in the Proposed Notice for Oil and Gas Lease Sale No. 53 (Federal Register, Vo)

II. Description of the Existing Environment

The following discussions are drawn from the Final Environmental Impact Statement (FEIS) for proposed OCS Sale No. 53. For an in depth discussion of each of the resources the reader is referred to the FEIS.

A. Physical Environment

1. Geological and Mineral Resources

The Eel River Basin extends from near Cape Mendocino (40°30'N) on the northern California coast northward for 200 km (125 miles) to Cape Sebastian (42°20'N) in southern Oregon, and from the coastline seaward to the continental slope, an average distance of about 70 km (44 miles). The south end of the basin extends inland for about 50 km (30 miles) in the lower Eel River-Arcata Bay area. The basinal outline encloses an area of 10,360 sq. km (4,000 sq. miles) which contains an estimated 29,270 cu. km (7,000 cu. miles) of marine Miocene and younger strata.

The axis of the Eel River basin trends N 80° W onshore (Ogle, 1953), but swings to a near northerly orientation offshore. Major structures offshore also parallel the basin trend. On the continental slope and adjacent marginal plateau folds involving Pliocene and possibly younger strata are expressed in the sea floor and are cut by high-angle reverse faults having dip separations that are predominantly west-side down (Silver, 1971). This structural pattern is interpreted as resulting from E to NE directed compression of the continental margin related to Quaternary underthrusting of the Gorda Plate. A major northwest-trending fault showing Quaternary displacement separates thick sections of Mesozoic and Cenozoic rocks south of Crescent City (Jennings, 1975). Associated with this fault are en-echelon folds that are stepped to the right (Silver, 1971). First motion studies of earthquakes during 1962-1965 indicate right-slip. (Bolt, et al., 1968) and Silver (1971) interprets this motion as the result of shear interaction between the Pacific and North American lithospheric plates.

Eel River Basin, lying north of the region of Neogene strike-slip faulting clearly extends ashore as the Humboldt Basin. Petroleum production from all of these onshore basins has been relativerly small. Humboldt Basin has had no significant oil production. Seventeen tracts were leased in this area in 1963 and four wells were drilled. All these leases have subsequently been abandoned.

There are nonpetroleum mineral resources in this area as well as potential petroleum resources. South of the Oregon border and north of Cape Mendocino there are several sand and coarse sand deposits; these deposits each cover an average area of 1 to 2 km^2. These deposits are in about 60 to 80 m (197 to 262 feet) of water and are probably remnant river deposits, deposited during Pleistocene lower sea level stand. Gravel deposits in this area are found almost exclusively around the Cape Mendocino area, in close proximity to rock outcrops. The average gravel deposit covers an area of about one-quarter square kilometer. Although no phosphorite deposits have been identified in the Eel River Basin, the presence of upwelling offshore of Eureka makes this area a potential phosphorite source area. Further research is needed to delineate phosphorite deposits and determine the quality and quantity of these deposits.

Black sand concentrations occur in beaches at quite a few other locations along the California coast, and many have been sampled or mined periodically in seach for gold. Some amounts of gold have been recovered from beach sands in Humboldt County, particularly at Gold Bluff where occasional high values of gold and small amounts of platinum have been found with magnetite and chromite sands. Beach sands near the Oregon border in Del Norte County contain high concentrations of iron and chromium minerals.

2. Geohazards

The offshore area of northern California is considered to be one of the most seismically active in North America (Seeber and others, 1970; Allen, 1976). The San Andreas fault zone bends westward at Cape Mendocino and merges with the Mendocino fracture zone. This junction is believed capable of producing a maximum probable earthquake of magnitude 8.3. Between 1853 and 1973, over 250 earthquakes occurred in the general area of the Eel River basin. Twenty-three of these events were of magnitude 5 or greater (McCulloch and others, 1977). Two of these earthquakes, one of magnitude 4.9 and the other of magnitude 5.6, occurred in the southern portion of the Eel River basin in the area of the proposed tracts.

Three major zones of slumping are present on the northern California continental margin. These areas are west of Crescent City, west of the Mad River and west of Eureka. The largest failure zone is about 175 sq km in area. It covers about 2.5 to 100 percent of tracts 005, 006, 009, 010, 011, 014, 015, 016, 019, 020, 021, and 024 (see Figure II-1). This zone consists of at least three coalescing slides. Several episodes of mass movement underlie the surface slides to a depth of about 200 m and extend 1-3 km beyond the boundaries of the surface slide. The most recent slides are less than 40 m thick along gently-dipping slip surfaces. Sea-floor topography over the slides is very chaotic and hummocky. The zone gradually dies out to the north (tracts 005 and 006) so that the boundary is hard to define and is questionable as drawn.

The second zone of mass movement is located along the plateau slope to the northeast. The entire zone (within the Sale area) is about 50 sq km in area and covers 1.5 to 60 percent of the underlying tracts. At least four individual coalescing rotational slumps, 30 to 70 m thick, are identified but are not differentiated.

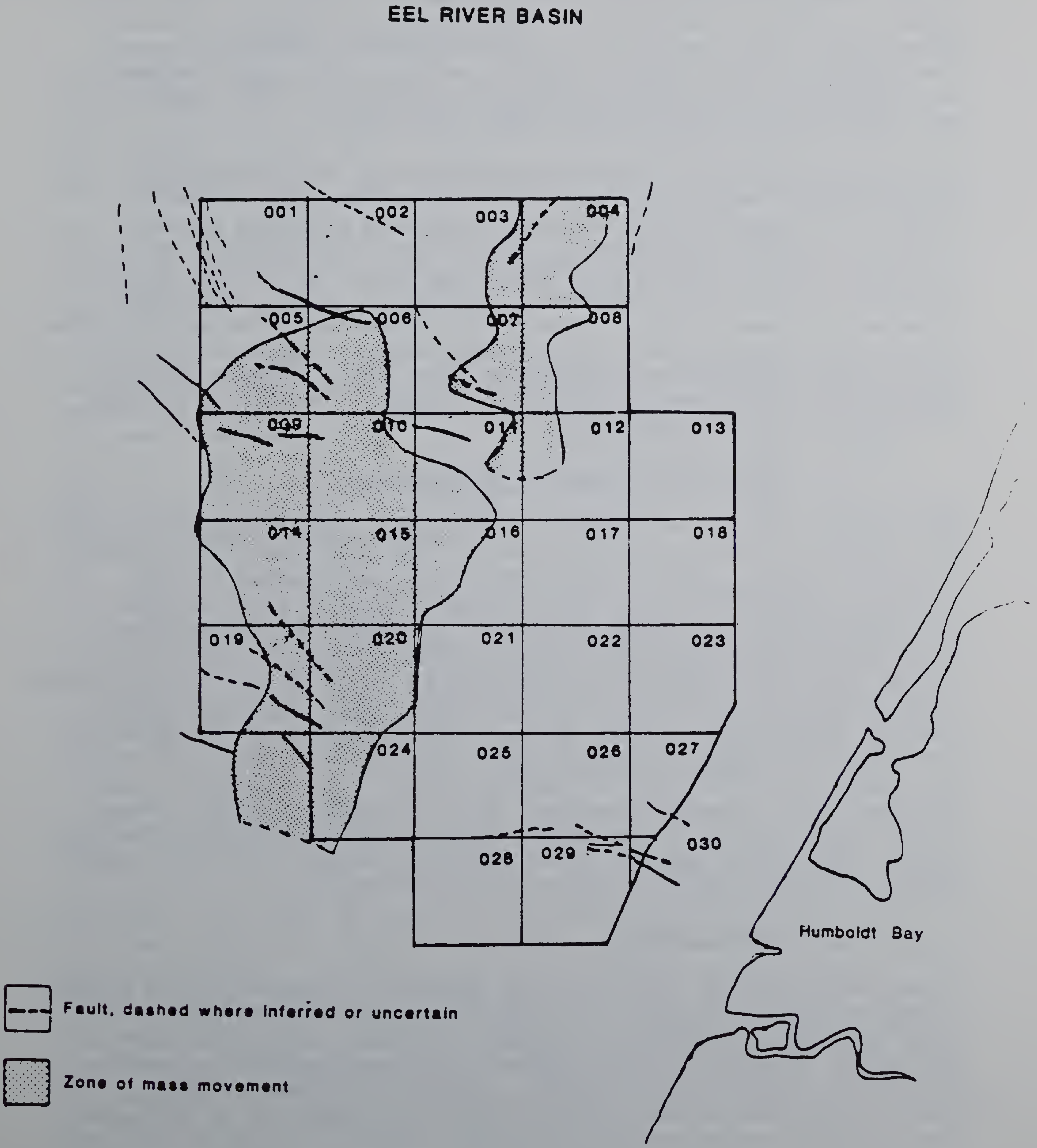

Figure II-1 Eel River Basin: Faults and Unstable Sea Floor

Associated with the large slump zones are areas identified as unstable sediment masses. These areas are characterized by sequences of unconsolidated sediment that lie on steep slopes or that show the effects of initiation of movement, such as rupture or bulging. Although many of the sediments in these areas show evidence of failure, there is no evidence of their translation or transport over significant distances. Nevertheless, these sediment units are apparently undergoing stress from multiple forces (gravity, uplift, currents, and fault rupture/ seismicity) and there is a suggestion that they will fail, perhaps in the near future, in the form of slumps and slides.

Two large areas having possible accumulations of shallow gas were identified, one area on the shelf west of Crescent City and another off Eureka. The identification of these areas from available seismic reflection data is inconclusive. The presence of abnormal pressures, whether it be due to shallow or deeper gas formations had not been encountered by previous exploratory drilling in the Eel River Basin (Zieglar and Cassel, 1978). However, the presence of abnormal pressures in onshore portions of this basin suggest similar conditions will be found within the offshore extension of this basin. Further detailed geophysical and geochemical studies are needed to verify the presence or absence of gas accumulations.

3. Physical and Chemical Oceanography

The complex physical and chemical oceanographic conditions and processes are detailed in the FEIS for Sale No. 53. Of particular note, however, are the following facts. Local eddies have been observed at Cape Mendocino, Trinidad Head and the jetties in Humboldt Bay. A large circulation gyre is located offshore of Pt. George and extends about 40 km to the south during the Oceanic Period (Pirie, et al., 1975). The Davidson Current sporadically surfaces inshore of the main California Current during the Davidson Period causing a small counterclockwise eddy off Humboldt Bay (Pirie, et al., 1975). However, tidal currents dominate at the mouth of Humboldt Bay when wind and river discharge are at a minimum. The Eel River Submarine Canyon is an upwelling locale. Longshore drift transports sediment north to south in spring, summer and fall and reverses during winter with the Davidson Period (Jones and Stokes, 1980). The most intensive upwelling occurs in the area south of Cape Mendocino where it occurs most of the year.

4. Water Quality

Water Quality is the degree to which chemical concentrations and physical parameters within a water mass approach the natural water condition. Good water quality provides a healthy environment for biota. State and Federal regulations and guidelines have been developed to ensure the highest level of water quality. Overall, the oceanic water quality along central and northern California appears to be very good. The exception to the generally high water quality is found in the areas adjacent to centers of population and in some harbors and embayments.

Bacterial contamination of the waters and shellfish of Humboldt Bay has long been a water quality problem. Additional causes of water quality impairment in the bay include vessel wastes, industrial wastes from timber products and fish processing industries, oil spills, and power plant (PG&E) cooling water and periodic cleaning waste discharge.

5. Climate and Air Quality

Along the California coastline, from Point Conception to the Oregon Border, many local variations in climate are evident within the two major climatic groups (i.e., North Coast and Central Coast). More rain-bearing storms strike the coast in the northern section and occur over a longer period. Mean annual temperatures are in the upper 50's.

North of Cape Mendocino the prevailing wind flow is northerly. Winds average 20 knots off the coast, but speeds are reduced greatly only a short distance inland due to coastal topography. For example, average wind speeds at Eureka are only 6 knots.

An inversion is defined as a layer in which the air temperature increases with height. Inversions are significant because pollutants are trapped beneath these layers. Inversions are present along the California Coast in summer nearly every day. Summer inversion heights are typically about 305 m (1,000 feet) in northern and central California coastal sections. These inversion conditions, combined with prevailing onshore flow, create a potential air pollution problem for coastal areas located downwind of major emission sources.

The primary restriction to visibility is fog. The North Coast, from Point Reyes to Eureka, experiences the most restricted visibilities during the summer. The incidence of low visibilities decreases further south, reaching a minimum on the central coast between San Luis Obispo and Monterey. South of San Luis Obispo, the percent of time with poor visibility increases again. The total frequency of visibility, less than 3 miles, ranges from about 15 percent of the time on the central coast to 30 percent of the time in some areas along the north coast.

Ambient Air Quality and Noise Levels. Air quality in a particular area depends upon the prevailing weather conditions, local topography, and the amount of pollutants being emitted into the air. Pollutant levels are measured by sampling or monitoring potential contaminants at selected locations. The State and Federal government have established levels of contaminants which should not be exceeded in order to protect public health and welfare. In California, the pollutants that frequently exceed these air quality standards are ozone (O_3), particulates (TSP), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and carbon monoxide (CO). Ozone, the most serious pollutant problem in California, is formed by the reaction of nitrogen oxides and hydrocarbons in the free atmosphere. The remaining pollutants are normally emitted directly into the atmosphere as a result of the combustion of fossil fuels.

Air quality in the coastal zone is regulated by local air pollution control agencies, the California Air Resources Board (CARB) and the Federal Environmental Protection Agency (EPA). In general, local agencies are responsible for regulating stationary sources while CARB regulates mobile sources as well as provides technical advice to the local jurisdictions. The EPA works closely with the State and local agencies to ensure that Federal air pollution standards and regulations are met. In California, The State and local regulations are usually more stringent than those promulgated by the EPA. Outer Continental Shelf (OCS) emissions are regulated by the Department of the Interior, USGS. OCS activities must be consistent with local coastal zone management plans and pertinent State and local regulations.

Humboldt County's air quality ratings in the TSP (total suspended particulates) category is better than Federal Standards. The O_3, NO_2, SO_2, and CO ratings are unclassified because of insufficient data.

B. Biological Environment

The reader is urged to review this section in the Sale No. 53 FEIS for an in depth discussion. The following will only briefly highlight resources that are potentially most sensitive to OCS development.

1. Commercial Fisheries

California's coastline is rich in fish life. Miller and Lea (1972) list 554 species of nearshore fishes. The 1976 supplement to their publication (California Sea Grant Program and University of California) included 8 additional species. Although some of these fishes are restricted to warm waters south of Point Conception, the majority are found in the area under consideration. When the deep-water fauna not considered by Miller and Lea is added, the total, of course, increases.

The California shelf is extremely high in fish productivity from a world standpoint. Although production over the whole shelf is intermediate compared to the worldwide range (10-3000 kg/km^2) (Moiseev, 1971), in parts of the Point Arena Basin fish productivity exceeds 3000 kg/km^2 and in parts of the Eel River and Santa Maria Basins it exceeds 2500 kg/km^2 (based on data obtained from California Department of Fish and Game).

Over 10% of the state's flatfish are caught in the Eel River Basin. Salmon, rockfish, sablefish and lingcod are also very important fisheries in this area. The commercial fishing industry is a mainstay of the local economies for most of central coastal communities of central and northern California. The value of this industry can be demonstrated by the port landings, although the true value of the industry is much greater than this due to the contributions of the support, processing, transportation and marketing industries.

Eureka is the most important port adjacent to any potential central and northern California lease areas and it is very important on a statewide basis with $12 million worth or 6.5% of the State's landings. Fort Bragg is the next most important port with nearly $6 million worth of landings. Between $2-4 million worth of fishes and invertebrates are landed at Bodega Bay, San Francisco, Moss Landing and Monterey.

Flatfish are demersal, and collectively they are one of the most important groups of fresh and frozen market fish in California; they are taken in the trawl fishery. The major species are: Dover sole, Microstomus pacificus; English sole, Parophrys vetulus; petrale sole, Eopsetta jordani; rex sole, Glyptocephalus zachirus; starry flounder, Platichthys stallatus; Pacific sanddab, Citharichthys sordidus; arrowtooth flounder, Atheresthes stomias; and California halibut, Paralichthys californicus. All the flatfish range from southern California to Canada or Alaska, except California halibut which occurs from Baja California to Washington. It is important to note that the Eel River Basin tracts directly overlap spawning areas for Petrale and Dover sole.

For additional information on fish and fisheries, refer to the FEIS for OCS Sale No. 53.

2. Marine and Coastal Ecosystems and Components

a. Plankton

The greatest significance of the phytoplankton lies in the role they play within the ecosystem. As primary producers, they convert inorganic carbon and water into complex organic compounds by the process of photosynthesis. Within the euphotic zone, light energy is captured by the chlorophyll and accessory pigments and converted into chemical bond energy which is then available for the plankton's metabolism or for the metabolism of the organisms of higher trophic levels. Plankton fluctuate spatially and temporally, and vary with the turbidity of the water column.

The upwelling period, which runs from late spring through the summer in central and northern California, depending upon the latitude, is the key to the high production of marine life, including fish and marine mammals. Lower productivity occurs during the other two oceanic seasons: the Oceanic period from late summer until October when offshore oceanic water predominates, and the least productive Davidson period during the winter when the surface current runs from south to north.

Zooplankton are an assemblage of animals which belong to nearly every phylum. The true plankton are those which are passively carried by oceanic tides and currents. These include both mero- and holoplanktonic species. Meroplankton are organisms that spend only part of their lives as plankton. Holoplankton spend their entire lives as plankton. Hydromedusae and the larvae of fish, shellfish, and many benthic invertebrates are the numerous, but seasonal meroplankton. Chaetognaths, euphausiids, copepods and larvaceans are members of the holoplankton which complete all stages of their life cycles in the water column. Zooplankton are a critical food source for innumerable species of fish and for some cetaceans.

b. Intertidal Benthos

The intertidal can be divided into sandy and rocky portions. The sandy intertidal is considerably less stable than that of the rocky intertidal. Every wave on a sandy intertidal beach moves large amounts of sand. Animals living on surf-swept rocky intertidal areas have solved the problem of wave shock by evolving powerful attachment devices or by living in cryptic habits. Organisms on surf-swept sandy beaches achieve the same solution by burrowing (burying) themselves in the sand.

Because of the continued restructuring of sandy beaches, the number of individuals per species varies greatly from year to year. There is, however, a characteristic group of animals which live just below the low tide line or within the sand between the tide lines. A few organisms even live higher up on the beach in burrows or beneath organic debris.

Accounts dealing with sandy areas are few. Although Allen (1964) collected 20 species in northern California, only the mole crab was collected every year (1958 to 1961), the others were absent or in low abundance at least one of the years studied. As few as 3 to 5 species were collected at a site, while the maximum collected per site was 18, far fewer than rocky intertidal areas. Rocky intertidal areas are much richer. For example, Glynn (1966) found 93 species in the Endocladia-Balanus zone at Pacific Grove.

Two sandy zone species of recreationally and economic importance, are the razor clam Siliqua patula, typical of the northern regions, and the pismo clam Tivela stultorum, more common in central California.

In Humboldt County there are large sections of the coast with the ecologically more valuable rocky intertidal zones. Thirty-nine miles of the county shoreline (32 percent) are rocky. Numerous offshore stacks significantly increase the area available to rocky intertidal organisms. Two particularly productive rocky intertidal areas in this section of coast are Patrick's Park, including Wedding Point, and Trinidad Head.

c. Subtidal Benthos

There is a wide range of variation in characteristics exhibited by subtidal benthic communities. The most significant physical factors contributing to these variations are depth and substrate type. The proposed lease area will include rocky reefs (hard substrate), cobble and gravel, as well as sand, mud and clay (soft bottoms). Biological factors which may influence benthic community structures include such phenomena as breeding aggregations, reproductive swarming, patchy larval settling, predation, seasonal migrations, and longevity.

A generalized sediment distribution pattern across the continental shelf would consist of sandy habitats nearshore, dominated by filter feeding organisms, followed by progressively deeper environments of silt and clay sediments with increasing numbers of deposit feeders. At the shelf break, where the continental slope begins, the sediment has become completely silt and clay (e.g., mud) and the community is dominated by deposit feeders. Exceptions to this sequence occur at canyon and reef areas.

Generally, hard bottom/rocky bank habitats are of primary interest since they often support prominent communities (e.g., kelp and coral) and cover relatively small areas of the outer continental shelf. Kelp habitats are present along a major portion of the California coast, occurring to depths of approximately 30.5 m (100 feet). The distribution of coral beds is not well known in northern and central California; Monterey Canyon and select areas near Carmel Bay and Point Buchon, however, are noted for the presence of coral outcrops. Although the coral beds are not of the tropical reef-building kind, they do include hydrocorals (e.g., Allopora), horny corals (e.g., Lepidisis, Paragorgia) and ahermatypic stony corals (e.g., Paracyathus, Balanophyllia). An important hard bottom area extends through portions of tracts 003, 004, 007, 008, 011, and 012.

d. Estuaries

Estuaries are bodies of water, ranging in size from streams to large bays, which communicate with the sea through usually constricted openings. The openings of many estuaries are closed to the sea for certain periods of time. Most have salinity gradients, being nearly freshwater near the head, where a freshwater stream typically enters and close to seawater near the entrance into the sea at the mouth. Estuaries themselves are highly productive and important habitats for both transients and full time residents, who belong to nearly every major plant and animal taxonomic group. Many birds are dependent upon the highly productive bays for all or part of their life cycles. Some vegetation such as Cordgrass (Spartina sp.), pickleweed (Salicornia sp.) and eel grass (Zostera sp.), occur almost exclusively in estuaries. They form salt marshes and eel grass beds, which are some of the most productive habitats known in nature. The mud flats are rich in invertebrates, in cluding clams, which are important to sportsfishermen. Fish and mobile invertebrates occur in the channels as well as over mud flats. Estuaries are also very important to the continental shelf ecology in central and northern California, serving as spawning or nursery grounds for marine fish and invertebrates, habitat for many oceanic birds, and as suppliers of nutrients to the near shore environments.

Out of 47 estuaries in Central and Northern California, 29 (62 percent) occur north of San Francisco. All are considered important bird feeding areas, but northern California estuaries are particularly important as fish nursery areas and anadromous fish routes. Seventy-nine percent of the estuaries north of San Francisco are important nursery areas (vs. 35 percent to the south), while 62 percent of the northern estuaries are important anadromous fish streams compared with 47 percent to the south. More estuaries are open year round in northern California (48 percent) than in central California (24 percent), reflecting the greater amount of rainfall and importance of the estuaries north of San Francisco. It should be noted that the longer "opening times" for these northern estuaries makes them more vulnerable to being oiled in the event of a spill.

The most important estuaries in Humboldt County are: Eel River Delta, Humboldt Bay, Arcata Bay, Stone Lagoon, Big Lagoon, and Freshwater Lagoon.

e. Marine Mammals

More than 22 species of cetaceans (whales, porpoises, and dolphins), 7 of which are classified by the Federal Government as endangered species, are found off of the central and northern California coast.

Of the endangered species most likely to occur in or near the proposed sale area, the gray whale is known to make extensive use of nearshore environments during migration. Sperm whales, although relatively abundant, tend to frequent offshore waters or waters near the continental shelf break. Similarly, the blue and sei are typically found further offshore in pelagic environments although nearshore sightings do occur. Humpbacks are transitory through the proposed sale area and typically are sighted, and make major use of, nearshore environments. The right whale is estimated to number no more than 200 animals in the entire North Pacific. The gray whale is the endangered cetacean most likely to make major use of the proposed sale area. The distribution and abundance of gray whales along the California coast is relatively well known. The majority of the eastern Pacific populations, about 15,000, twice pass off the coast of California on their yearly migration from Alaska south to Baja, Mexico, where they breed and then return. The majority of these movements, 98 percent, occur in a 4-month period during the winter (Dohl, et al., 1979). The migratory route of these animals is usually within 2 km (1.2 mile) of the shore. However, some animals seems to take the most direct route when crossing bights and indentations of the coastline.

Five species of pinnipeds (seals and sea lions) are commonly found on or offshore of the central and northern California coast. They are: the California sea lion, Steller's sea lion, elephant seal, harbor seal, and the northern fur seal. The first four species also breed in this area. The Eel River Basin is not as important an area for pinnipeds as some other regions along the coast. However, pinnipeds are numerous. Steller's sea lions, for example, have a rookery at Trinidad Head.

Sea otters do not occur in the Eel River Basin.

f. Seabirds

A diverse and abundant avian fauna occurs off Northern California. The species can be broken into four groups.

The Oceanic Group includes tubenoses, albatrosses, shearwaters, murres, and puffins. Some of the species form flocks numbering up to the tens of thousands. Most of the Oceanic Group can be found seaward of the shoreline. They tend to congregate in certain areas. The Eel River Canyon, just south of the tracts, is one such important area.

Loons, grebes, pelicans, and cormorants are included in the Coastal Group. These birds, also, congregate in huge numbers.

Sandpipers, plovers, and avocets are representatives of the Shorebird Group. They can be found along the shoreline in most undisturbed areas. They feed on a variety of invertebrates in the surf line.

The final category, Bay, Estuary and Lagoon Group, includes grebes, egrets, and waterfowl. Upland species, such as sparrows, blackbirds, and warblers, are also included.

Eel River Delta, Humboldt and Arcata Bays and Stone, Big and Freshwater Lagoons are important nesting areas for the resident species and are critical to the thousands of birds who utilize these areas during their migration. Raptors such as ospreys, bald eagles, and peregrine falcons are frequently found at many of these areas. The Blank Brant is an important waterfowl species that winters in the large shallow coastal bays such as Humboldt, Tomales, and Morro Bays.

Thirteen different seabird species breed on isolated sections of the coastline and on offshore rocks and islands. These nest areas occur along most of the coast.

g. Endangered Species

Endangered species consultation is described in the FEIS for Sale No. 53 and the Secretarial Issue Document. The continued existence of the endangered species within the Eel River Basin is not likely to be jeopardized, as determined by the Fish and Wildlife Service and the National Marine Fisheries Service.

C. Human Value Components

These are discussed in detail in the FEIS for Sale No. 53. Refer to that document for a considerable amount of tabular data and analysis.

1. Recreation and Sportfishing

The northern and central California coast is a highly sensitive natural resource area and is an important recreational asset to the residents of the State and to tourists. It is an extremely diverse area in respect to the landscape, in that it varies from rugged, wind blown cliffs to flat sandy beaches with stable dune backshores. This diversity creates a unique area which changes character at every bend of the shoreline and embayment, attracting tourists from all parts of the world to view the scenery and enjoy the solitude of vacationing in a pristine environment. Along the coast, recreation is primarily water-oriented, both from an active participation, and from an aesthetic and passive aspect.

The major recreational activities of the area are sightseeing, beachcombing, picknicking, boating, swimming, wading, sunbathing, diving, surfing, and sportfishing. Sightseeing and beachcombing are enjoyed along the entire coast and are mainly dependent on the esthetic aspect of the area.

The estimated value of tourism for Humboldt County, in 1979, was $35,000,000. Travel expenditures during the same time period were $64,600,000.

Sportfishing is an important recreational activity throughout central and northern California. Many tourists are attracted to the area by the rich supply of marine resources. Six fishing methods predominate in the central and northern California ocean sportfishery: shore, pier, skiff, party boat, skin diving (including SCUBA), and surf netting. Shore and pier fishing are by far the most popular methods, receiving over 80 percent of the hook-and-line effort (Miller and Geibel, 1973). Skiff, party boat (Young, 1969), skin diving, and surf netters follow. Although more effort may be expended in shore and pier fishing, more fish per hour may be caught from boats.

2. Socio-Economic Development

The California coastal region is the most highly developed region in the State. A significant share of the State's economic base is centered in coastal areas and approximately 64 percent of the State's population resides in coastal counties (including the southern California counties).

However, the relatively isolated region of the north California coast is somewhat different. It includes the counties of Del Norte, Humboldt, and Mendocino. These counties have the lowest population density of any California coastal region. The lumber and wood products industry dominates the area. While the proportion of employment in retail trade is comparable to state and national levels, the proportions found in wholesale trade, insurance, finance, real estate, and services are significantly lower than state and national levels.

Humboldt County has a significant economic dependence on the lumber and wood products industry. A general lack of diversification exists within the manufacturing sector. In recent years, up to 80 percent of total regional value added has been derived from lumber and wood products. During the past 20 years, there has been a concomitant secular decline in the timber industry. Because of the significant unemployment that has resulted, the increase in per capita income in the area has been below state and national averages. Eureka is the major population center for Humboldt County, located on the 12-mile long navigable Humboldt Bay.

3. Transportation

Humboldt Bay, located at the city of Eureka in Humboldt County, is one of the few natural deep water harbors on the West Coast of the U.S. It is the only deep water port between San Francisco, 270 miles to the south, and Coos Bay, 230 miles to the north. The bay is considered a deep water harbor, in spite of its general shallowness, because of the naturally deep channels within it. These natural deep channels are used for navigation. Some require dredging. The U.S. Army Corps of Engineers has maintained channels in Humboldt Bay since 1881.

The Corps has had a current navigation improvement project for Humboldt Bay and Harbor which is designed to increase channel depths and widen certain reaches in North Bay. These improvements are to make it possible for larger ships to 11.3 m (37 feet) in draft and approximately 230 m (750 feet) in length to call on the bay without experiencing inordinant tidal delays or sailing partially loaded due to restricted draft. The Corps has also been preparing plans for navigation improvement for the

Fields Landing Channel in South Bay. Channel depths of 9.1 to 10.7 m (30 to 35 feet) are being considered. Since the worldwide trend is toward larger and more efficient ships, there could be further needs to improve navigation by the year 2000. The Corps of Engineers has indicated that the channel depths in North Bay could ultimately reach 12.2 m (40 feet).

4. Other

For a discussion of land use, cultural resources and other human value components, see Section III and the FEIS for Sale No. 53.

III. Analysis of the Proposed Action and Alternatives

The analysis of impacts in this section is based on the assumption that there are 111 million barrels of oil and 315 billion cubic feet of gas, conditional mean estimate. Environmental impact discussions include information presented in the OCS Sale No. 53 Final Environmental Impact Statement and the Secretarial Issue Document.

A. Significant Impact Producing Agents

Significant impact producing agents are: manmade structures (onshore and offshore), vessel traffic, noise, water and air emissions, changes in socio-economic activity, and environmental hazards. For an in-depth discussion of the impact producing agents, the reader should see FEIS for Sale No. 53. Based on oil and gas estimates for this proposal, Tables I-1 to I-3 in Section I give the possible number of wells, platforms, subsea completions, miles of pipeline and volume sediment disturbed by pipeline burial and volume of drill fluids and sewage that would result from the proposed action.

In addition to the above impact producing agents that will result from the normal or routine activities, oil spills represent an episodic or occasional event that could result from equipment failure, poor operation techniques, or a variety of events. The FEIS for Sale No. 53 should be referred to for a complete discussion of oil spills. Based on the estimated oil and gas resource for this proposal, there would be a statistically expected 0.24 oil spills of 1,000 barrels or greater over the life of the project. The probability that one or more oil spills would contact any Humboldt County coastal land within 30 days is 2%. The probability that one or more oil spills would contact any Humboldt County coastal land within 3 days after a spill is 1%. (For a description of the oil spill risk analysis model and assumptions, see FEIS for Sale No. 53, Chapter IV.A.1.)

B. Environmental Impacts

1. Anticipated Impacts from the Proposal

a. Physical Environment

Air Quality; Air pollutant emission associated with the proposed activities include hydrocarbons (HC), nitrogen oxide (NO_x), carbon monoxide (CO), sulphur dioxide (SO_2) and particulates (TSP). Hydrocarbons and, to some degree, nitrogen oxides contribute to the formation of ozone or smog. Hydrocarbon emissions occur primarily during loading and ballasting of tankers and during gas processing. Smaller quantities are emitted from oil storage tanks, pipeline flanges, and internal combustion engines (deisel or gas). NO_2, TSP, SO_2 and CO emissions may occur as a result of offshore drilling and oil processing where power for these activities is supplied by internal combustion engines. CO and TSP emissions for these sources are generally quite small and do not create a problem. Uncontrolled emissions of NO_2 and SO_2 are more substantial.

A computer simulation modeling study was performed to estimate the onshore air quality impact of Sale No. 53 activities. The analysis that was done involves a cumulative impact analysis in that it includes existing sources as well as projected air quality degradation that is expected from the proposed action. The results show that despite the application of DOI air quality regulations, for individual facilities some residual air quality deterioration will occur. For a complete discussion of the results, see POCS Reference Paper No. 53-5 (Air Quality Impact of proposed OCS Sale No. 53 Offshore Central and Northern California, 1981.)

The onshore areas in Humboldt County currently meet the standards for all regulated pollutants. OCS development could increase ambient pollutant levels slightly; however, even with this increase no violations of the standards are expected. The increment from OCS sources in a "worst case" situation could exceed the level of deterioration considered significant by the DOI air quality regulations. As a result, some additional controls would be required for NO2 since the onshore area currently meets the standards.

Water Resources: The pelagic and benthic marine habitats immediately under and adjacent to drilling rigs and production platforms will suffer degraded water quality (as measured by increased turbidity and increased concentrations of contaminant metals and hydrocarbons in the water column) due to discharges from OCS development and production activities. Increased hydrocarbons and possible toxic effects of formation water discharges may result in possible elimination of native marine organisms or entire communities with replacement by invading opportunistic species or species assemblages. Water around rigs and platforms may demonstrate increased chemical oxygen demand (COD) because of discharges. The dilution of discharged materials by surrounding marine waters should limit the significant impacts to within several kilometers of the discharge point. Losses of marine organisms, due to direct toxic actions of drilling fluids and/or formation water, is difficult to assess. Evidence both for and against significant toxic effects at concentrations encountered under field conditions exist for at least some drilling muds. The possibility of synergistic effects among the various constituents discharged routinely from platforms and rigs on the degradation of water quality and loss of marine organisms remains uninvestigated and unknown at this time.

Estuaries and wetlands may incur losses of species due to degradation of water quality in areas where currents move from developing lease tracts to sensitive areas or where onshore activities related to OCS development cause increased domestic or industrial effluents to be discharged near these types of habitats. Additionally, the water quality of estuaries would be significantly degraded if oil from an oil spill entered this sensitive environment. Oil entering an estuary may have a long term impact on the area, lasting 5 to 10 years or more.

Onshore water resources could suffer some impacts due to increased demand for water supplies and increased sewage capacity as a result of population increases associated with OCS development in areas adjacent to proposed lease tracts. The losses involved would be depletion of fresh-water resources and possible water quality degradation of water bodies receiving increased sewage effluents.

Significant reduction in water quality should be moderate in the Eel River Basin due to normal or expected OCS development. Losses in this basin will be restricted to areas adjacent to activities platforms which are projected to be built as a result of oil and gas production activities. This basin could experience the second largest volume of discharged materials of the five proposed basins. Onshore water resources in the Eel River area appear adequate to support the projected increases in local populations due to OCS related industry. Sewage treatment facilities should be more than adequate to meet the area's needs with the exception of one plant at Loleta which is at capacity.

In addition to the water quality impacts that could result from expected OCS development activity, an oil spill would further alter the water quality. Water quality in estuaries could be significantly reduced if oil were to enter the estuarine environment.

b. Biological Environment

Commercial Fisheries: The greatest impacts on commercial fisheries probably will be from oil spills. It is unlikely that commercial fishermen will harvest in the area of an oil spill because: 1) their boats and gear may be contaminated, 2) they may be confined to port by oil containment booms, and 3) direct coating and incorporation of petroleum hydrocarbons can cause tainting of commercial organisms, rendering them unmarketable. If gear is heavily contaminated it will need to be cleaned or replaced. Also, oil can affect fish (and other marine organisms) by: 1) direct lethal toxicity, 2) sublethal disruption of physiological or behavioral activities, 3) direct coating, 4) incorporation of petroleum hydrocarbons into the organism, and 5) habitat alteration. The last four can lead to the eventual death of the organism. If numerous sexually mature animals are killed, the size and reproductive potential of the population (and available stock) will be significantly reduced. Biological damage from an oil spill can range from light to nearly total devastation (Blumer and Sass, 1972; National Academy of Science, 1975).

Since most oil remains at the surface, species which occur in the surface layer are the most vulnerable to impacts from oil. If numerous sexually mature animals are killed, both the size and reproductive potential of the population will be directly reduced. Although there are too many variables to accurately predict these impacts, low to moderate ecological losses could occur.

Oil may have a significant impact on salmon and other anadromous fishes (see Fry, 1973) that use chemical cues to return to their native streams to spawn. Since oil could interfere with their ability to detect these natural cues, these fishes are particularly vulnerable to oil in the sea when they first enter the sea as young and later when they return to spawn. Field tests have shown (Malins, 1980) that salmon will initially avoid a contaminated fish ladder but later some will use the ladder despite higher levels of hydrocarbons. Also, salmon have been shown to avoid oil in laboratory experiments (Rice, 1973). Therefore, oil contamination of estuaries and streams probably would prevent some anadromous fish from returning to their native streams to spawn. In the case of a large spill reaching an estuary, such contamination could reduce the runs for a period of 5 years or more, resulting in high ecological losses.

The economic impact of oil spills on commercial fishermen during the entire life of the project is extremely difficult to assess. If it assumed that a spill greater than 1,000 barrels would cause a 10% reduction in salmon landings for 5 years (10% probably is the smallest amount that will be distinguishable from annual variations in catch), the potential impact on commercial fishermen for salmon alone can be estimated by multiplying the 1976 value of salmon landed at ports near the basin times 0.10 (for the 10% reduction), times 5 (for 5 years), times the number of expected spills. The estimated loss over the life of the field is $330,000.

(Data from 1976 were used because that is the most recent year for which these data are available. Inflation and changing market conditions probably will cause the value of the losses to increase.)

Economic losses also could occur if there are decreases in the population sizes of species whose adults are concentrated at the surface at the time of the spill, but these cannot be estimated. Since it is unlikely that fishermen will harvest in the area of an oil spill, there could be additional losses to those who fish for other species, but most fishermen probably will be able to fish other areas. Economic commercial salmon fisheries losses also would be incurred by support, processing, transportation and marketing industries.

In addition to the commercial salmon fisheries that would suffer from a decrease in the salmon fisheries, both sport fishing and the intense salmon fishing by Native Americans could be significantly impacted. Although this impact could have a short term impact, oil that would enter an estuary during salmon migration would have a long term impact.

Many other species use estuaries as spawning or nursery areas. If a large spill occurs and oil gets into an estuary and stays for several tidal cycles, there would be high ecological losses to these species as well.

Reduction in the population size of one species may significantly affect other species in the food chain. Because the marine food web is extremely complicated, it is not possible to assess how significant the reduction of one species will be to others.

The fisheries most likely to have significant conflicts with offshore structures are the trawl fisheries (see discussion in Centaur Associates, Inc., 1980). The total fishing area that will be precluded by OCS structures is very small. Multiplying the number of platforms, offshore storage and loading facilities, subsea production systems, floating production systems, and subsea completion units predicted for the basin times the area that would be lost by a 1,320 foot radius buffer zone and dividing by the total area for the basin yields 1.8% loss in fishing area.

Offshore manmade structures also can cause disruption of critical habitats, particularly during placement. Within the Eel River Basin are several tracts which overlap the Dover sole and Petrale sole spawning areas (see the Commercial Fisheries alternative in the FEIS for OCS Sale No. 53). If these spawning grounds are disrupted, the reproductive capabilities of these species could be reduced, causing a severe impact on the populations and commercial fisheries for these species. In 1976 over $1.5 million worth of these species were landed in Eureka. Additionally, it has been suggested that unburied pipelines could interfere with the seasonal migration of the Dungeness crab. If this is true, this could significantly impact the population and fishery.

Often, fishermen will approach close to an offshore structure because fish are attracted to them. It is likely that at least one net will be lost on one out of every five subsea production systems and subsea completion systems. Assuming total net loss (although the net may only be damaged), the loss, including the cost of lost fishing time, is estimated to be $40,000.

It is important that pipelines be compatible with fishing because they often traverse a large area. In southern California, pipelines have had little conflict with commercial fishing. However, when one pipeline was laid in the Santa Barbara Channel, mud mounds were created by the barge's anchors, and these mounds are interferring with trawling operations.

Debris dropped overboard will interfere with trawling operations. OCS Order No. 7 prohibits the disposal of any waste material which will adversely affect commercial fishing except under emergency conditions. However, some materials will be accidently dropped overboard, particularly in bad weather.

Onshore, competition between the oil and gas industry and commercial fishing industry can occur for berthing spaces and services. Unless the commercial fishing industries' interests are carefully considered by the local governments and the oil and gas industry before a port is used, significant impacts to the commercial fishing industry could occur.

Drilling muds are of concern because very little is known about their long-term, chronic impacts. There are indications that these muds could produce elevated trace metal concentrations in marine organisms and interfere with reproductive processes (e.g., the Dover and Petrale sole spawning grounds in the Eel River Basin).

The greatest conflicts with vessel traffic may occur with seismic boats since they pull a 2-mile long cable behind them precluding fishing in the area. Gear set in place could be lost if fishermen do not receive adequate notice that a seismic boat will be in the area. Also, fishermen have found that after a seismic boat passes through an area, sonar shows the fish move to the ocean bottom and subsequently fewer fish are caught. Although this is probably a short-term impact, it is possible that when combined with other impacts it could have a long-term effect in some areas.

If oil reaches the oyster mariculture operations in Humboldt Bay, they would be impacted similar to other commercial fisheries. These impacts would be significant and could last for up to 5 years.

Marine and Coastal Ecosystems and Components: Both rocky shores and sandy beaches could be affected by an oil spill. Of these two areas, the literature indicates that the rocky shores would be more seriously affected. Although many important rocky intertidal areas occur along the Humboldt County coast, it is difficult to select specific areas as being more impacted than others. Intertidal habitats begin to repopulate relatively soon after any reduction in the biota. This repopulation could be retarded in areas that are isolated. Trinidad Head appears to be one of the important rocky intertidal areas that is isolated and is susceptible to oil spills.

Although recovery will probably be somewhat slow because of the isolation of selected rocky habitats, recovery occurs and eventually is completed. In non-isolated areas, recovery should begin within weeks to many months, depending upon the time required for the oil to leave the intertidal surface. The time required for the biological recovery will vary greatly with the species, ranging from weeks for some smaller invertebrates to 5 years for animals like the gooseneck barnacles. Recovery to community normality is variable, and could take as long as ten years, creating a long term significant impact.

Plankton and kelp are two groups of organisms that should not be seriously impacted from an oil spill. Although the kelp shows a high tolerance to oil, the biota that is associated with the kelp community could be impacted as the result of an oil spill. The kelp community biota could sustain an ecological loss which could interfere with ecological relationships for a period of a year.

There are many estuaries along the Humboldt County coast (see Section II in this report and DOI, 1980). Estuaries are among the most important types of ecosystems in the world. They influence the ecological balance of adjacent ocean areas and serve as an important source of nutrient for near shore areas and as spawning, nursery, or transportation areas for many offshore species of fish and invertebrates. If a large oil spill were to enter an estuary, a high ecological loss would almost certainly result. The disruption of the estuary would probably last for ten years or longer and could create a long term significant impact.

Marine Mammals and Seabirds: Essentially, three types of hazards exist to marine mammals and seabirds as a result of offshore petroleum development. These are: 1) floating or beached oil; 2) increased human activity and disturbance; and 3) ecosystem contamination. In addition, OCS development could preempt critical seabird habitats. The FEIS for Sale No. 53 should be reviewed for a detailed description of these impacts.

Losses caused by oil spills to seabird and marine mammal populations in this basin are expected to be low. Less than one oil spill is projected to hit this basin over the life of the project. The effects of chronic discharges are unknown; however, it is unlikely that these discharges could cause a high ecological loss given the assumption that only four platforms will be constructed in this basin. Seabird and marine mammal populations are widely dispersed and are not expected to congregate near these platforms. It is also assumed that species preyed upon by seabirds and marine mammals would not change their distribution pattern in favor of congregating near platforms.

The effects of disturbance and noise are expected to be low due to the low level of anticipated activity.

The Fish and Wildlife Service and National Marine Fisheries Service Endangered Species Opinion (DOI, 1980) conclude that OCS oil and gas exploration activities are not likely to jeopardize the continued existence of the American peregrin falcon, the bald eagle, the brown pelican, the California least tern, the Salt marsh harvest mouse, the California Clapper rail, the endangered whales or the sea turtle. Another opinion will be necessary if the proposed oil and gas activities reach the development and production stage.

c. Human Value Components

Recreation: Recreation and tourism are important industries in Humboldt County. Recreation includes such activities as camping, sight seeing (aesthetics), photography, and also sportfishing.

Recreation and tourism could primarily be impacted by an oil spill or the placement of massive structures (platforms) on the OCS. The total fishing area that will be precluded by OCS structures will be minimal.

If an oil spill occurs or moves into a sportfishing area, fishing would be temporarily discontinued until cleanup has been completed unless alternative fishing areas can be used. Additionally, fishing boats may be confined to port by oil containment booms.

A major spill could have temporary economic impacts upon operators of passenger carrying fishing vessels who rely upon sportfishing activities for their living, and on local tourist industries that rely on their marine resources to attract visitors. Any decline in salmon and other anadromous fish populations will have a more significant impact on sportfishing.

In general, the auditory and visual impact of OCS activity should be minimal. One area that local residents feel the visual aesthetics will be significantly impacted is the OCS area surrounding Trinidad Head and Patrick's Point.

Assuming no mitigating measures are in place, the potential loss computed for recreationists and the regional economies is $16,000 and $150,000, respectively.[a]

Socio-Economic Systems: Welfare losses to socio-economic systems from OCS development could result from the following: 1) infrastructure stresses could result in an area because of changes in population/employment (with associated changes in the demand for public/private goods and services), and 2) social stresses resulting from changes in the economic base of an area (if changes cause displacement of traditional activities or community values and customs).

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[a] All losses are assumed to occur in the initial year of development. No discounting assumptions were made. Analysis based on: high use month attendance, % day use/% tourism, expected number of spills, and number of boating days in a month.

The degree to which an area is affected by economic change that might result from oil and gas development depends primarily on the size and nature of the existing supply of labor and other resources. The extent of losses (or possible benefits) also depends on the magnitude of a project in a particular area and how it compares to existing economic activity in the region.

Direct and induced population changes in adjacent Humboldt County could involve an additional 1,214 persons in the peak production year of 1990 (direct and induced jobs could be 520 of this amount). This constitutes a 1.2% change from the projected base for that year. It is unlikely that this degree of change could cause very important infrastructure stresses. However, because the economy in the region is presently primarily dependent upon the timber industry, and to a somewhat lesser extent on agriculture, fisheries, and tourism, there could be more moderate changes in the economic base of the area. The petroleum mining sector could expand significantly in this region, and draw employment and resources from other sectors. The impacts on employment hold out the possibility of being beneficial, as there is presently some unemployment and underemployment in the region.

The development of an onshore support base in the onshore area could cause some more important localized impacts. An onshore base would likely be located somewhere along the 12-mile long navigable Humboldt Bay. Large amounts of land in Humboldt Harbor are designated as unclassified. Conditional-use designation is required to establish zoning policy, particularly for industrial facilities or water-dependent industry. The zoning ordinances that exist do have light and heavy industrial classification, but the specifics of these classifications have not yet been determined. Because the industries that presently dominate the area are somewhat seasonal, there is an interest by the Coastal Commission in expanding industrial development. However, the type of industry and the scale of expansion is not yet determined. The issue will be addressed in the local coastal plan.

Infrastructure impacts could be increased when other activity is included in the projected base over the life of the project. Additional projects would necessitate planning activity by local government to accommodate needs that could arise with increased population and changes in the economic structure. Moderate impacts could result in Humboldt County due to infrastructure stresses.

Transportation (Ports and Navigation): Economic losses can be expected to occur as a result of collision between OCS structures and vessels and between vessels. Economic losses resulting from oil spill damages to vessels are considered neglibible and are not examined. Economic losses could also result from port closures due to oil spill containment equipment (such as booms) blocking the entrances to Humboldt Bay.

Since there are insufficient OCS-related vessel operation collision records in the California offshore area, the collision and cost damage records in the Gulf of Mexico were used to estimate losses. Estimated collisions between OCS structures and vessels, and between vessels are predicted for

The duration of the producing field. These collisions would result in estimated damages of $504,000 and $48,000, respectively (in 1980 dollars). The impact of port closure is estimated to be minimal.

Cultural Resources: Cultural resources of concern in OCS development are historic ship and plane wrecks, coastal historic structures (e.g., lighthouses), marine and terrestrial aboriginal sites, and contemporary Native American beliefs and practices.

The potential for damage or destruction of marine archaeological resources may result from exploratory drilling activities, construction of platforms, and laying of pipelines.

BLM has records of approximately 50 shipwrecks of historic interest in the area of the proposed tracts. The following tracts are within one nautical mile of one of these reported wreck sites or within five nautical miles of a cluster of three wrecks: 018, 023, 206, 207, 209, 030. Tracts 04, 08, 012, 013, 016, 017, 020, 021, 022, 024, 025 are within ten nautical miles of a reported wreck site. It is expected that the survey requirement of the cultural resources stipulation will be invoked on tracts 023 and 027 because of the large number of historic shipwrecks in the vicinity. There is a potential for aboriginal sites on tracts 012, 013, 017, 018, 021, 022, 023, 025, 026, 027, 028, 029, 030.

Because welfare losses of the kind noted above could occur to archaeological and historical resources, survey requirements of the cultural resources stipulation are invoked on leased tracts most sensitive for historic shipwrecks. The impact to these cultural resources is minimal when the proper surveys, as required by Cultural Resource Stipulation, are conducted.

Table Bluff lighthouse is an historic structure in this area. However, it is not considered subject to visual intrusion because the lighthouse and its original environment are not intact.

There is an unknown number of important coastal Native American ceremonial/religious or subsistence and medicinal gathering sites, many of which are located between Trinidad and the Lagoon area north of the tract area. Spiritual intrusion could occur on known ceremonial/religious gathering sites from oil spills. It is also possible there are additional important Native American sites unknown to BLM that may be subject to spiritual intrusion from OCS activities and structures. Redding Rock is a known mussel-gathering site.

C. Alternatives

There are five alternatives to the proposed action. These alternatives are discussed in Section I.C. The impacts for this proposal would be reduced or eliminated if the associated alternative was adopted under the proposed action. For a complete discussion of the alternatives see the FEIS for OCS Sale No. 53 (DOI, 1980).

D. Irreversible and Irretrievable Commitment of Resources

1. Natural Resources

a. Mineral Resources

Leasing of tracts included in the proposed oil and gas lease sale would permit development and extraction of the hydrocarbon resources. The U.S. Geological Survey estimates net recoverable reserves (risked mean) of 42 million barrels of oil and 120 billion cubic feet of gas. Leasing of the proposed tracts and subsequent development and extraction could represent an irreversible and irretrievable commitment of these resources.

b. Land Resources

Industrial development in support of offshore oil extraction, which would occupy coastal lands, could include the following: service bases (permanent or temporary), repair and maintenance yards, general shore support, bases supporting platform and pipeline installation, pipelines and landfalls, partial processing facilities, gas processing and treatment plants, and marine terminals.

The proposed sale would require an area for basic support facility. If the finds were sizable enough, a marine terminal may be necessary.

While usage of lands for facilities such as these may be long-term, they are not generally considered irreversible. However, where new land uses result in the disruption or destruction of natural features or processes, such that return to the previous land use is not possible, an irreversible commitment of resources would occur. An example might be the conversion of a wetland to another use.

2. Labor Resources

A decision to proceed with the proposed Sale would result in the production of certain OCS-related goods and services. To the extent that resources would be drawn away from other uses, production of goods and services in other areas or of other types would be foregone. Steel products, specialized manpower, and capital consitute required resources which may be scarce; and use of these resources to develop the northern California sale area could mean that other opportunities for their use might have to be foregone. While these resources may be reclaimed over time, their use as a result of this proposed sale would constitute an irreversible and irretrievable commitment of resources at a given point in time. To the extent that unemployed resources are used, the employment of resources would not constitute a cost to society in the form of foregone opportunities.

Deaths and permanent disabilities from OCS offshore operations are an irretrievable loss of human resources. Between 1970 and 1977, there have been 131 deaths and 197 injuries from such activities. Although they cannot be completely eliminated, deaths and injuries are minimized by continuous updating of OCS safety standards.

E. Relative Gains/Losses of Short-Term Uses to the Long-Term Productivity

The extraction and consumption of mineral resources would preclude their use at a later date and reduce the total reserves in the long term. However, should this proposal result in the discovery of recoverable resources, known reserves could be increased and the area could be opened to additional future sales. If this took place, the activity period would be extended past the year 2006 and, therefore, could be considered as having more long-term effects on the productivity of the offshore and onshore environment. Future sales and extension of OCS-related activities in this region could have pronounced long-term effects on many biological communities.

During the exploration and production phases, there will be very limited interference with the longer term uses of the environment, such as commercial fishing and recreation. Temporary impacts to marine communities would result from construction and operation of offshore facilities. Short-term losses would include an anticipated (but unquantifiable) reduction in biological productivity, changes in marine habitats, reduction in populations of plankton, nekton, fish, benthos, birds, mammals, and modification of the food web.

Onshore development and sale related jobs will cause some population increases and shifts. These may cause short-term adverse impacts to communities. Impacts will be greatest if OCS-related facilities are located in areas of low population and minimal existing industrial infrastructure. Long-term socio-economic changes are expected to be very slight.

After the completion of oil and gas production, oil spills and their impacts will not occur, and the marine environment is generally expected to remain at or return to its normal long-term productivity levels. It has been recognized that continuous, low-level pollution from toxic chemicals, including oil, may adversely affect long-term productivity. However, to date there has been no discernable decrease in long-term marine productivity in OCS areas where oil and gas has been produced for many years. Until more reliable data becomes available, the long-term effects of the chronic and major spillage of hydrocarbons cannot be accurately projected.

In summary, short-term environmental and socio-economic impacts would result from the proposed sale. Oil and gas reserves would be lowered. Few long-term productivity or environmental gains are expected as a result of the proposed sale; the benefits of the sale are expected to be principally those associated with a medium-term increase in supplies of domestic oil and gas.

IV. Consultation and Coordination

During preparation of the draft and final EISs for OCS Sale No. 53, extensive consultation and coordination was conducted with Federal, State and local government agencies, special interest groups and the general public. No additional consultation or coordination has been conducted for the preparation of this Environmental Assessment.

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